

RHIC Project
BROOKHAVEN NATIONAL LABORATORY

RHIC/RF Technical Note No. 5

Parameters of an RF Cycle for Au⁷⁹⁺ and p

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Abstract

A longitudinal emittance 0.30 eVs/u is assumed. Major parameters (bunch length, bucket area, bucket length, synchrotron frequency etc.) of gold and proton cycles are calculated and plotted throughout the acceleration cycle.

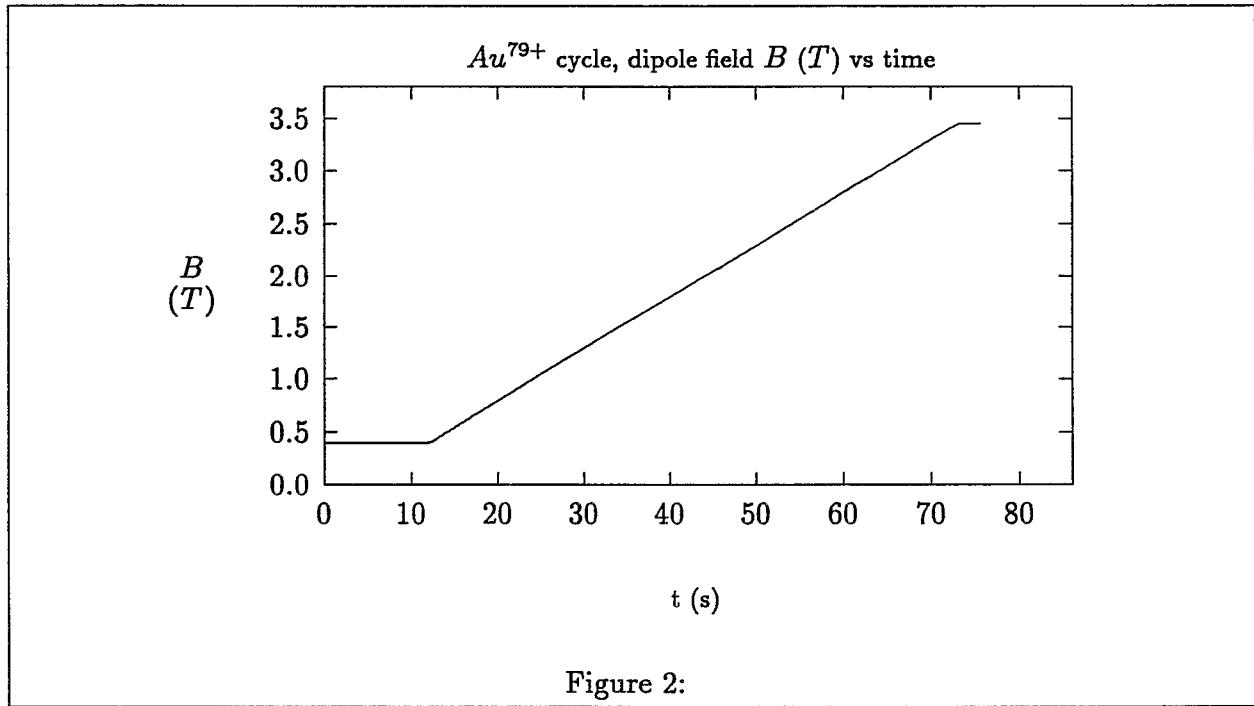
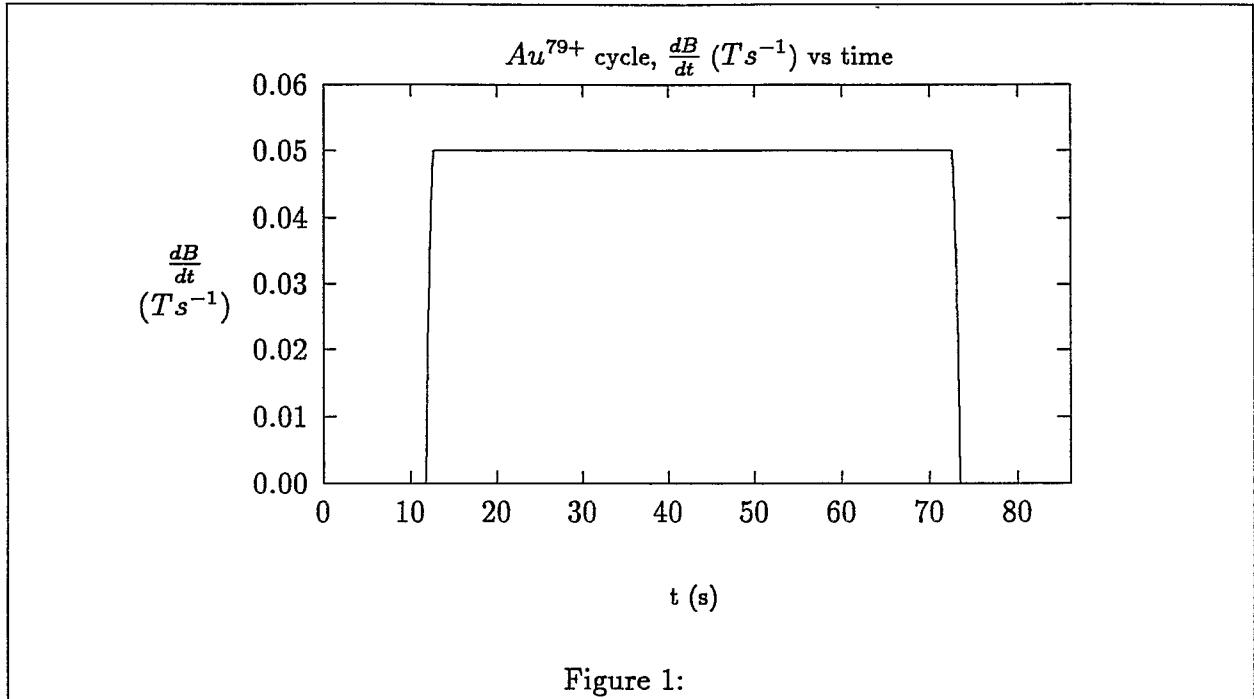
1 Introduction

The cycle used here starts from a few second before acceleration, ends prior the beam being transferred from accelerating cavities to storage cavities. The gold beam goes through transition, and experiences a γ_{tr} jump. The proton does not go through transition. Since the nominal matching voltage for proton is too low, a bunch rotation is assumed and the bunch length is reduced by one half in AGS.

The ramp between two plateau is connected by a quarter period of *sine* wave form. For instance, the V_{rf} is ramped up from matching voltage to acceleration volts or ramped down to make a bunch rotation; \hat{B} is ramped from zero to its maximum value.

Note that excluding the region of γ_{tr} jump, γ_{tr} is taken as 23.6. Small changes in the value of γ_{tr} have little effects on the overall results.

2 Au^{79+} cycle



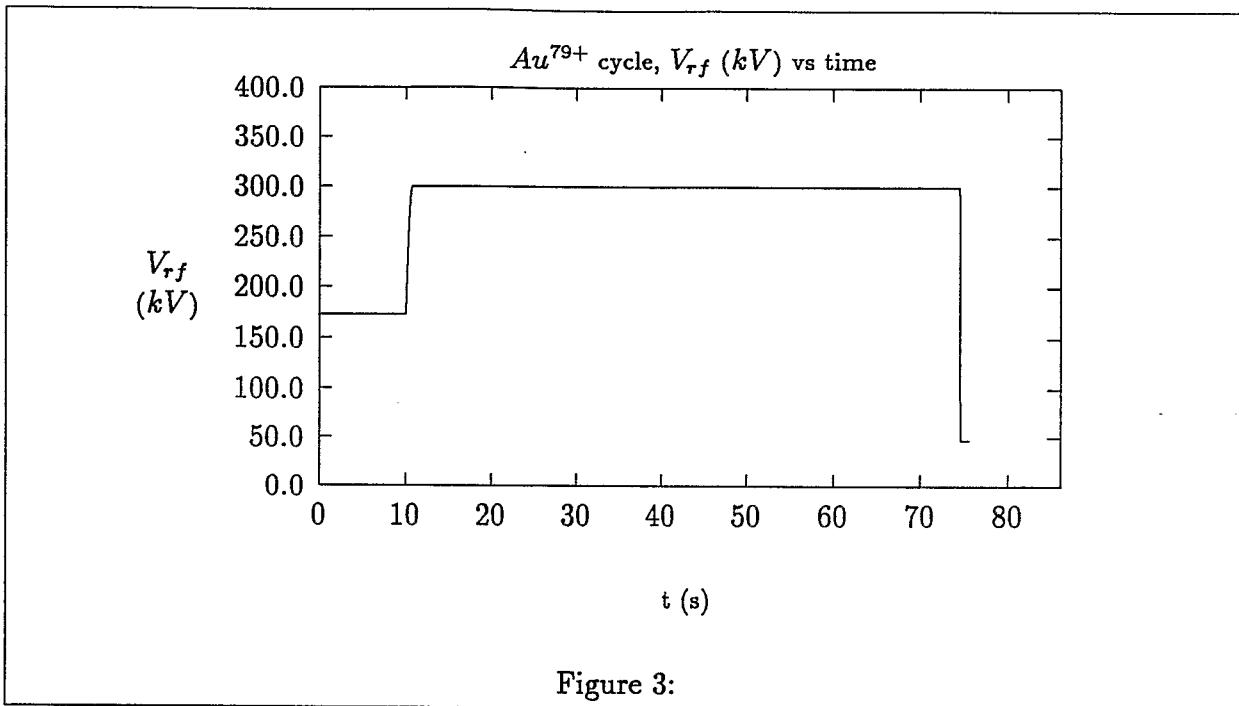


Figure 3:

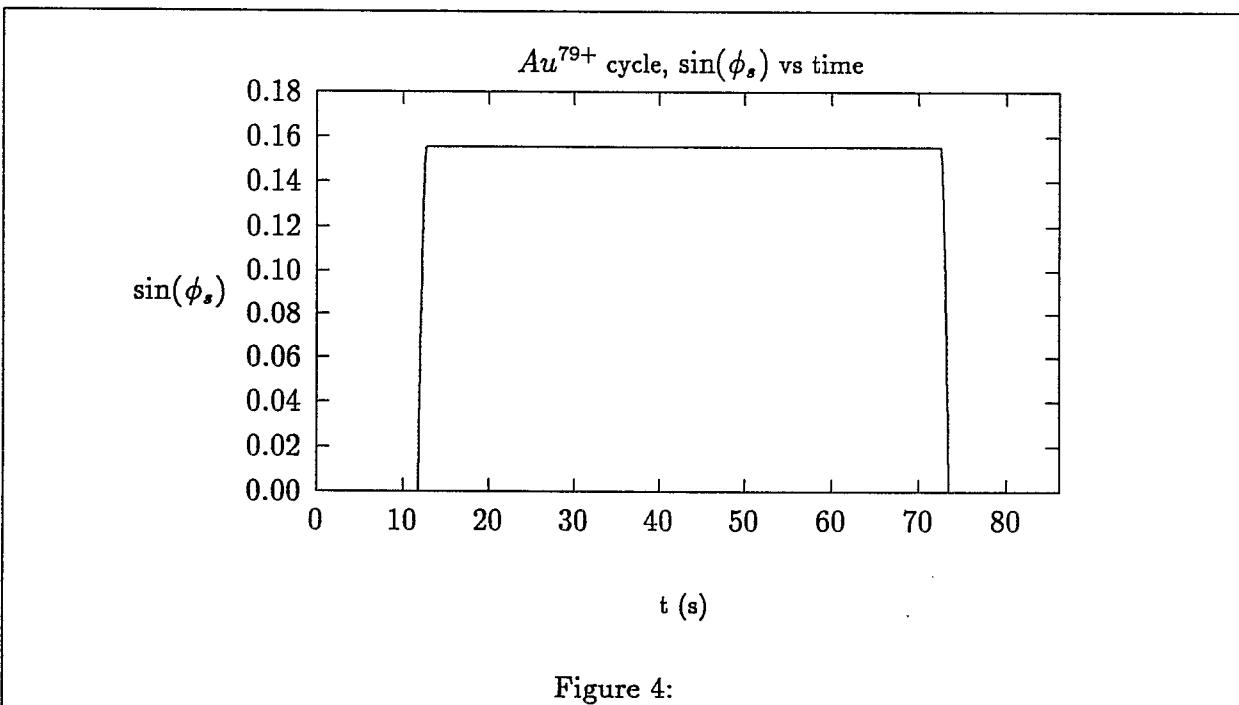


Figure 4:

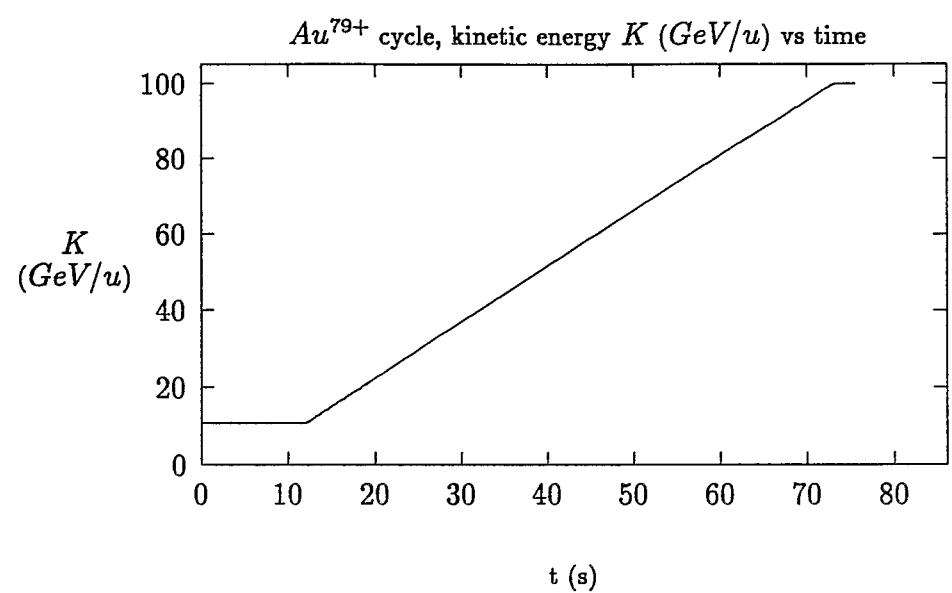


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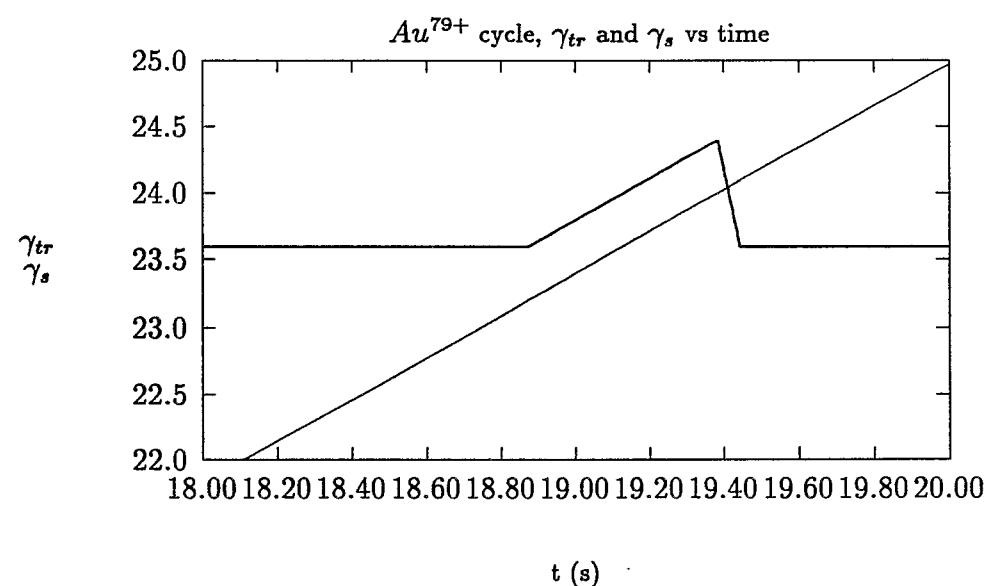


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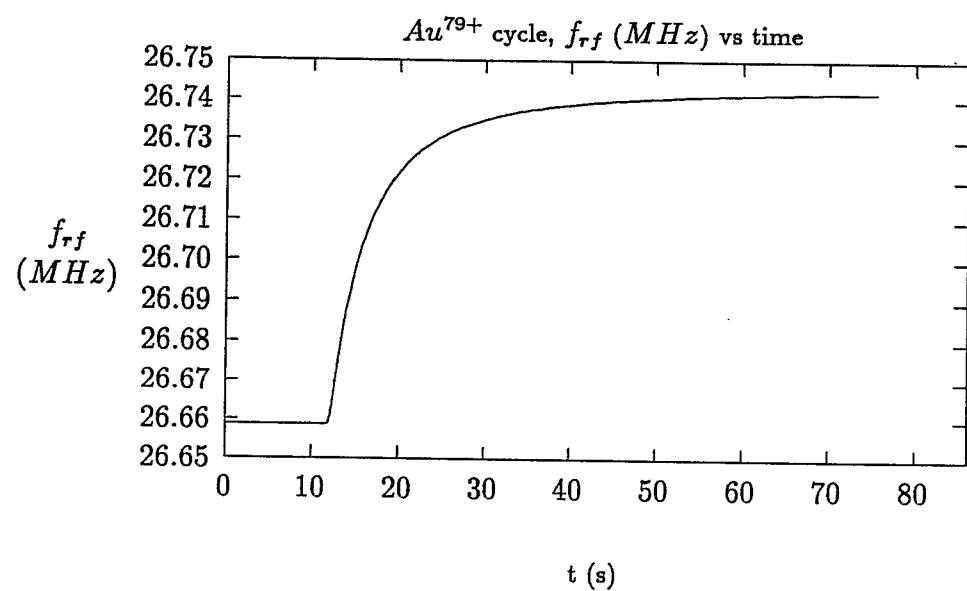


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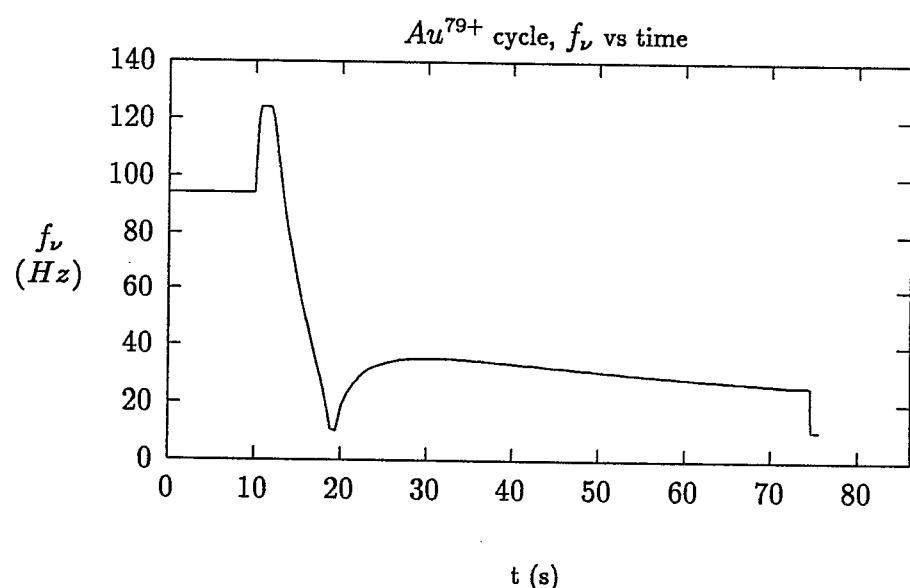


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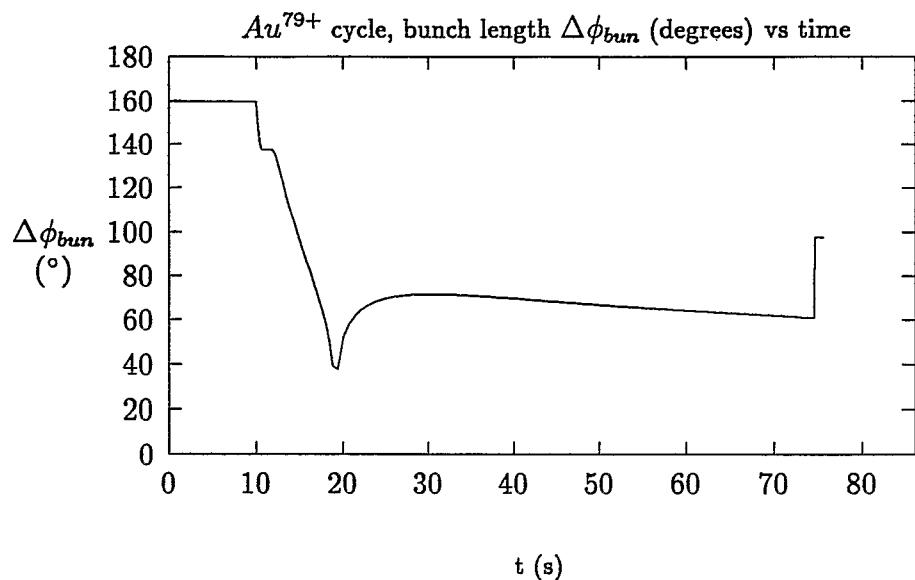


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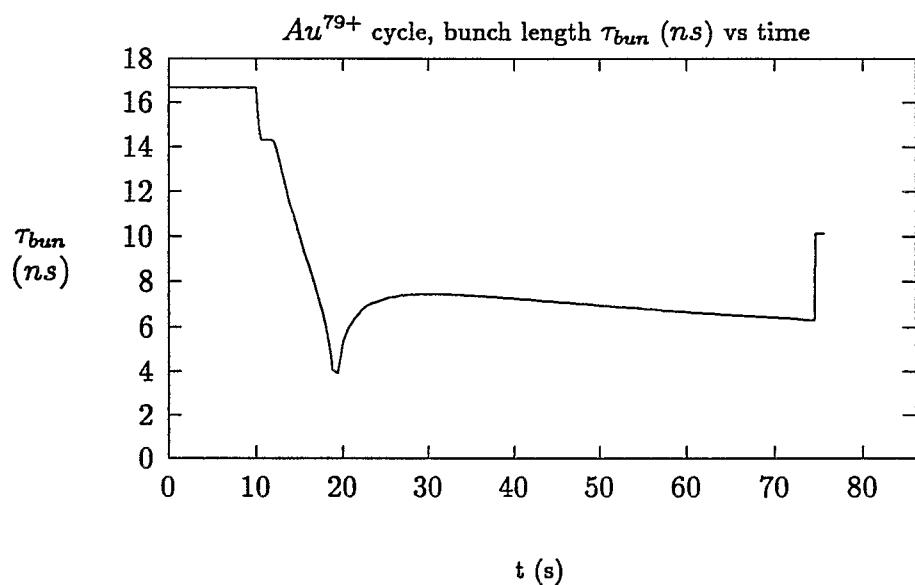


Figure 10:

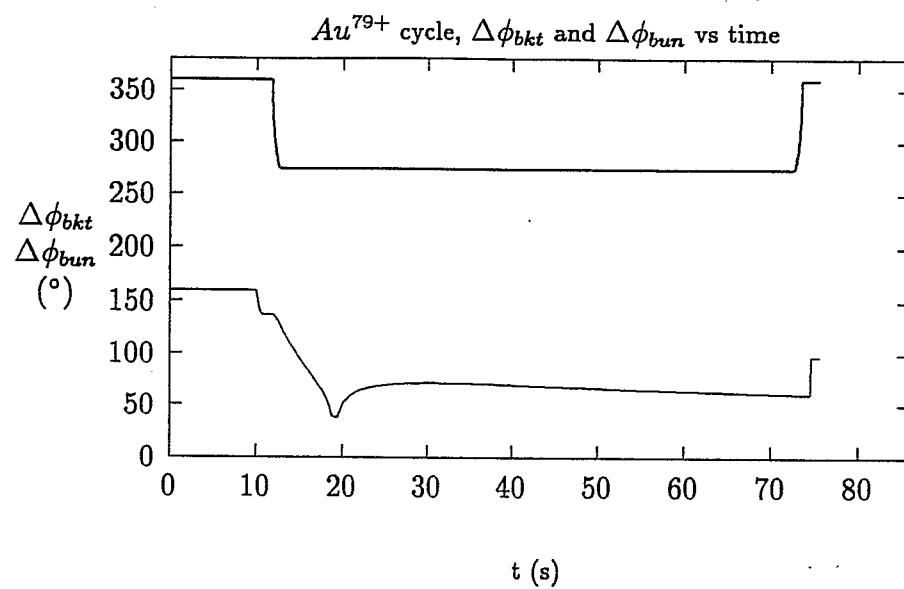


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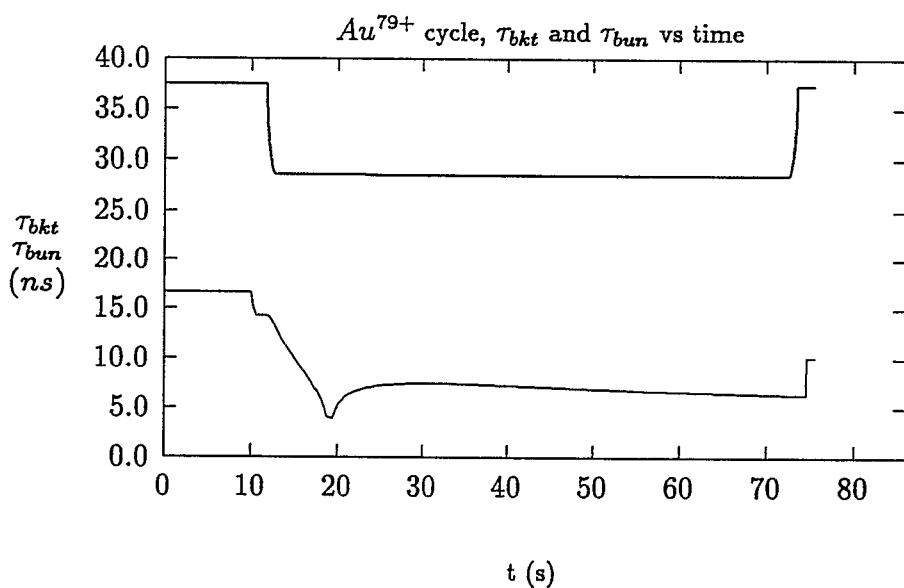


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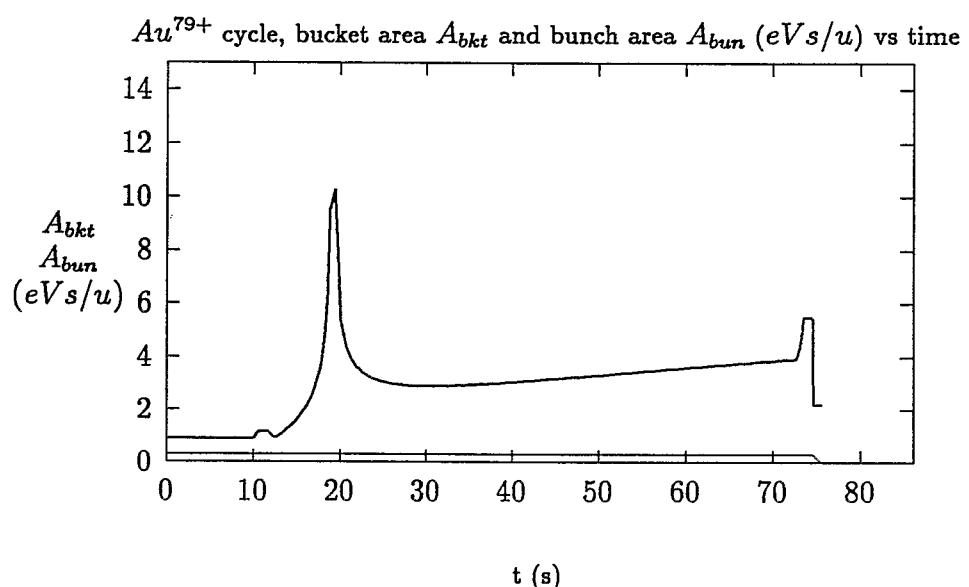
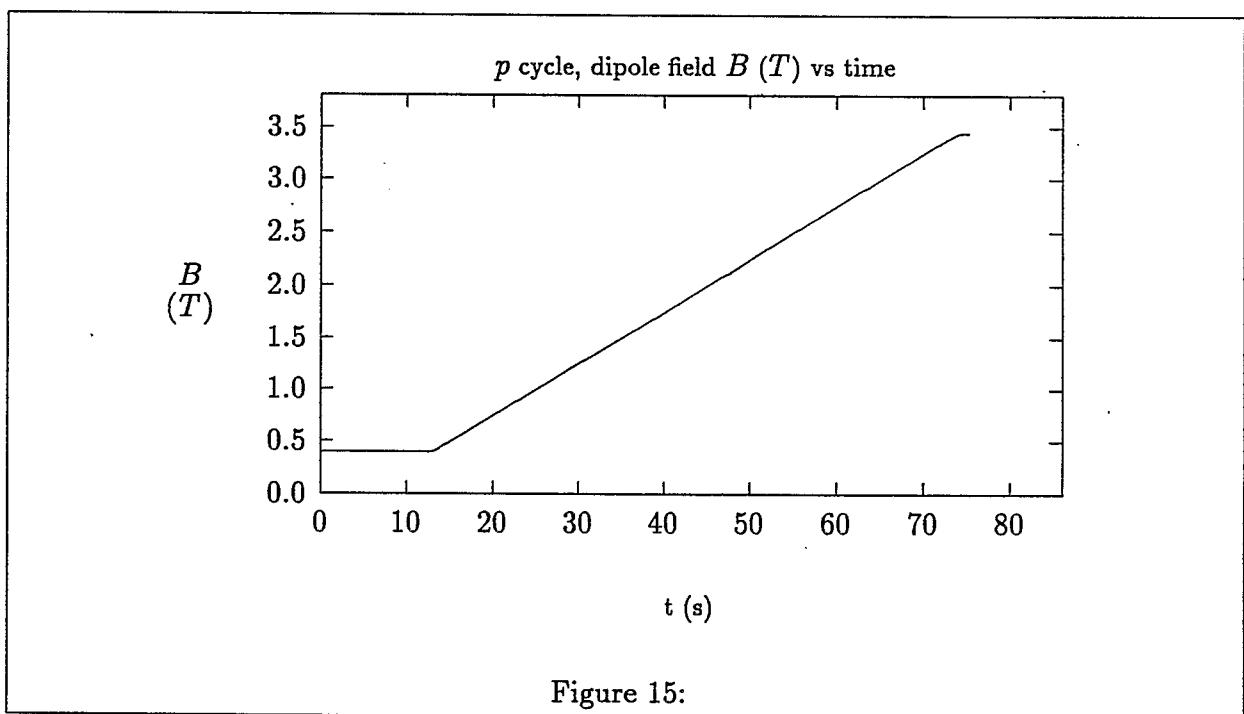
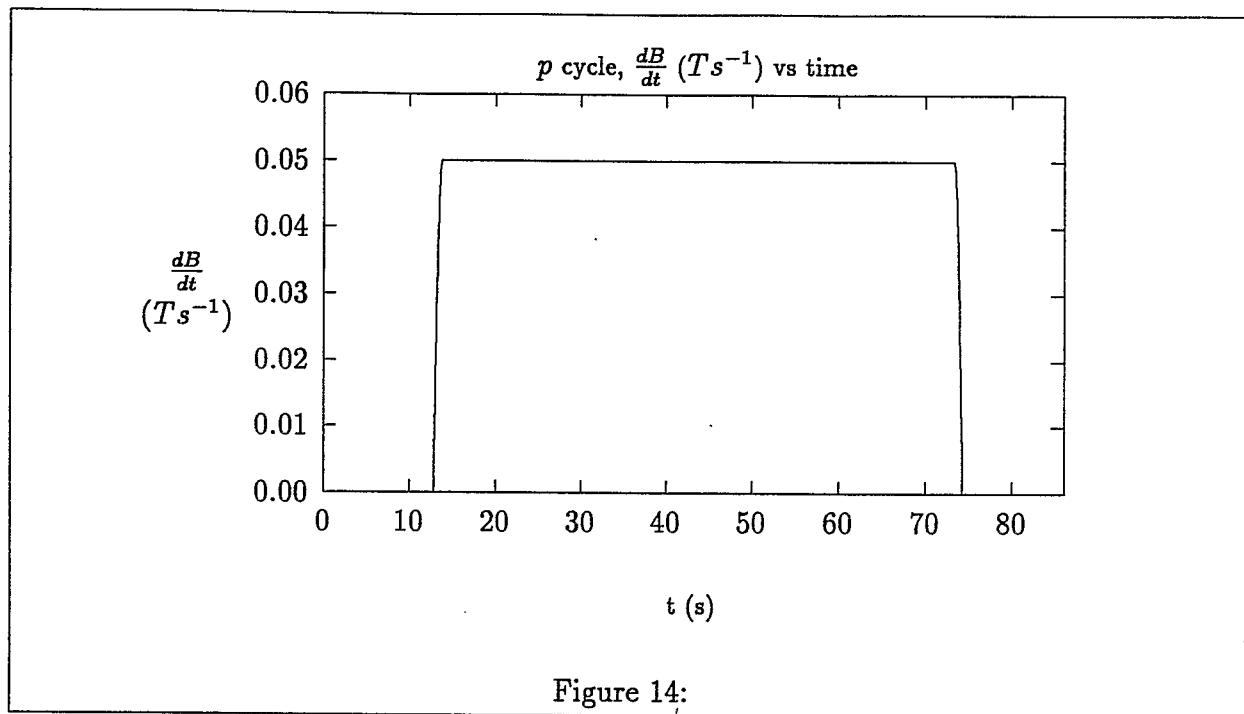


Figure 13:

3 *p* cycle



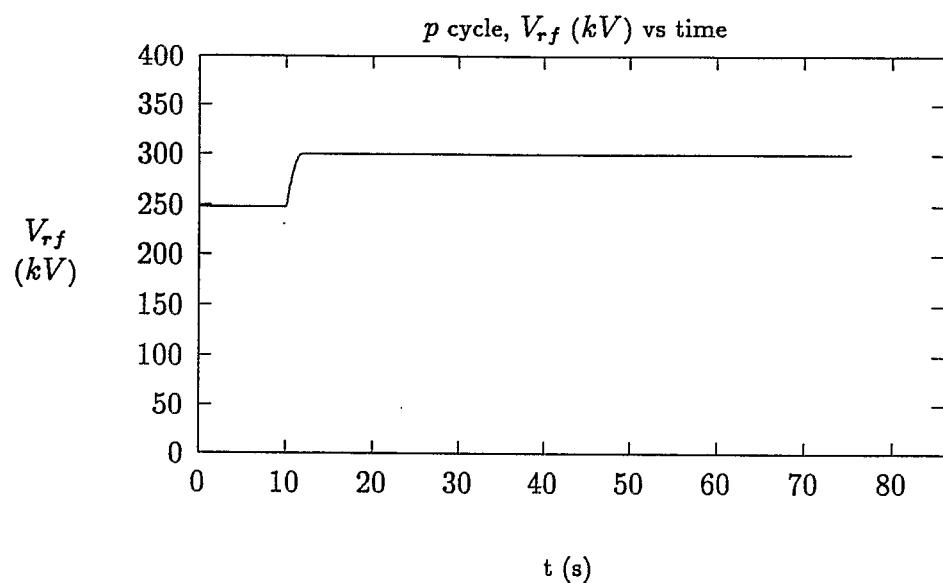


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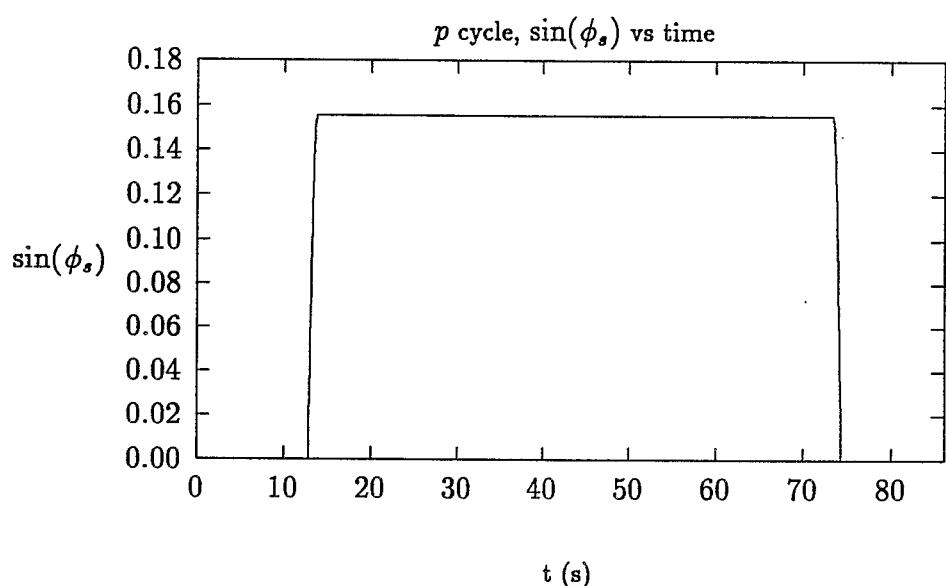


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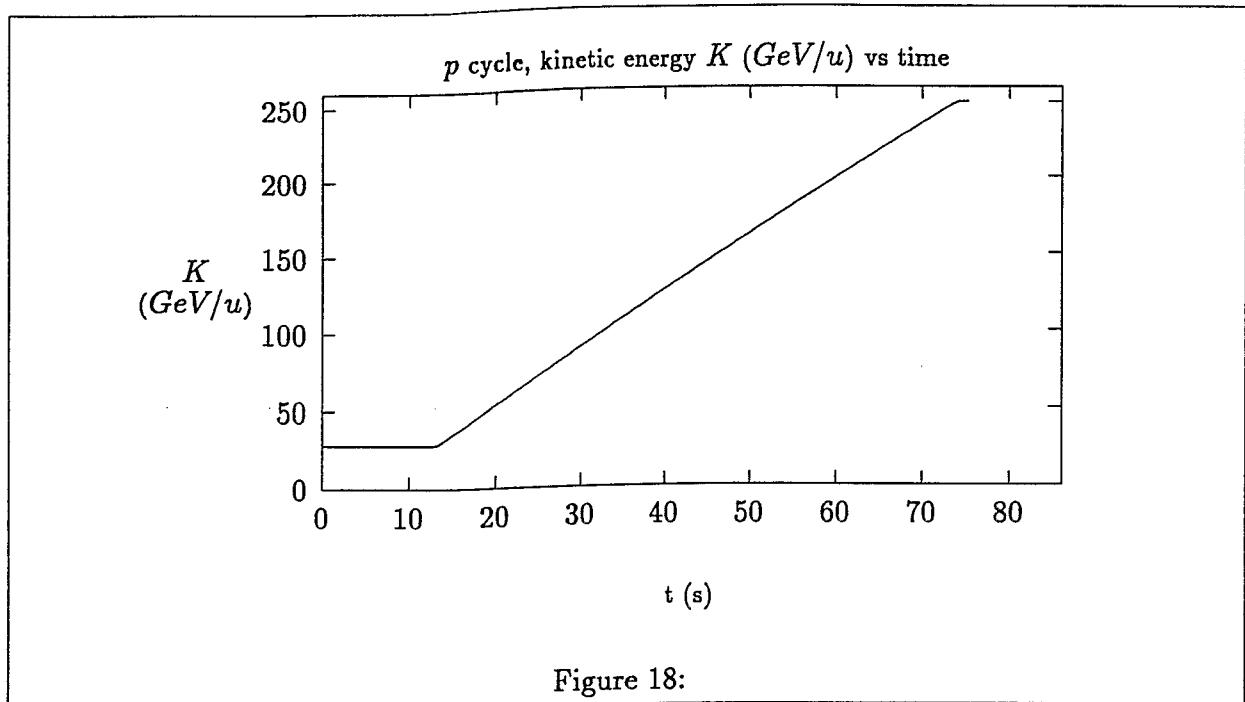


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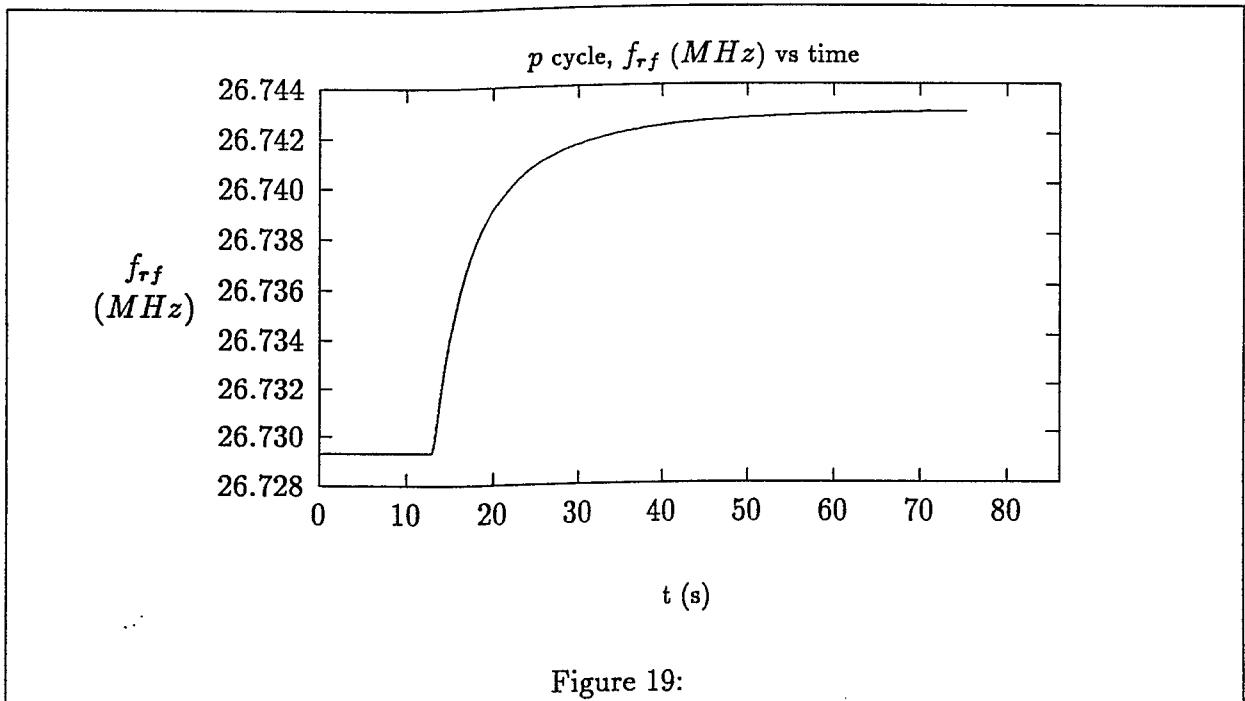
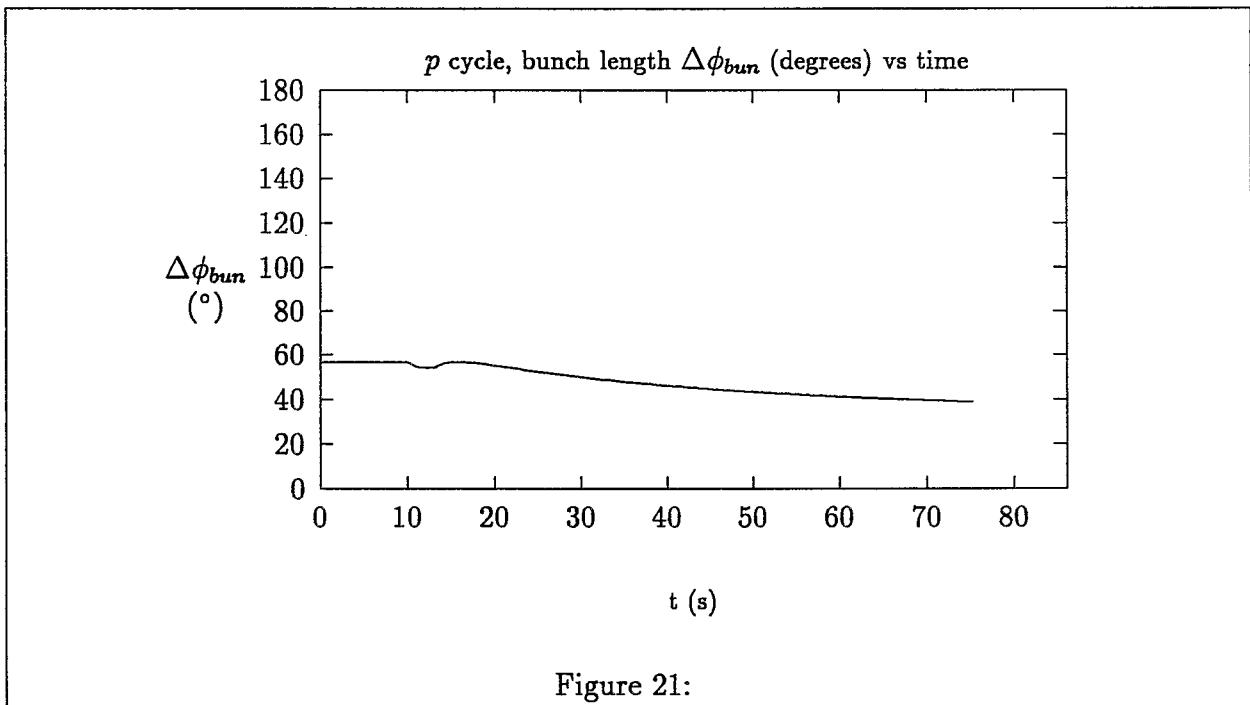
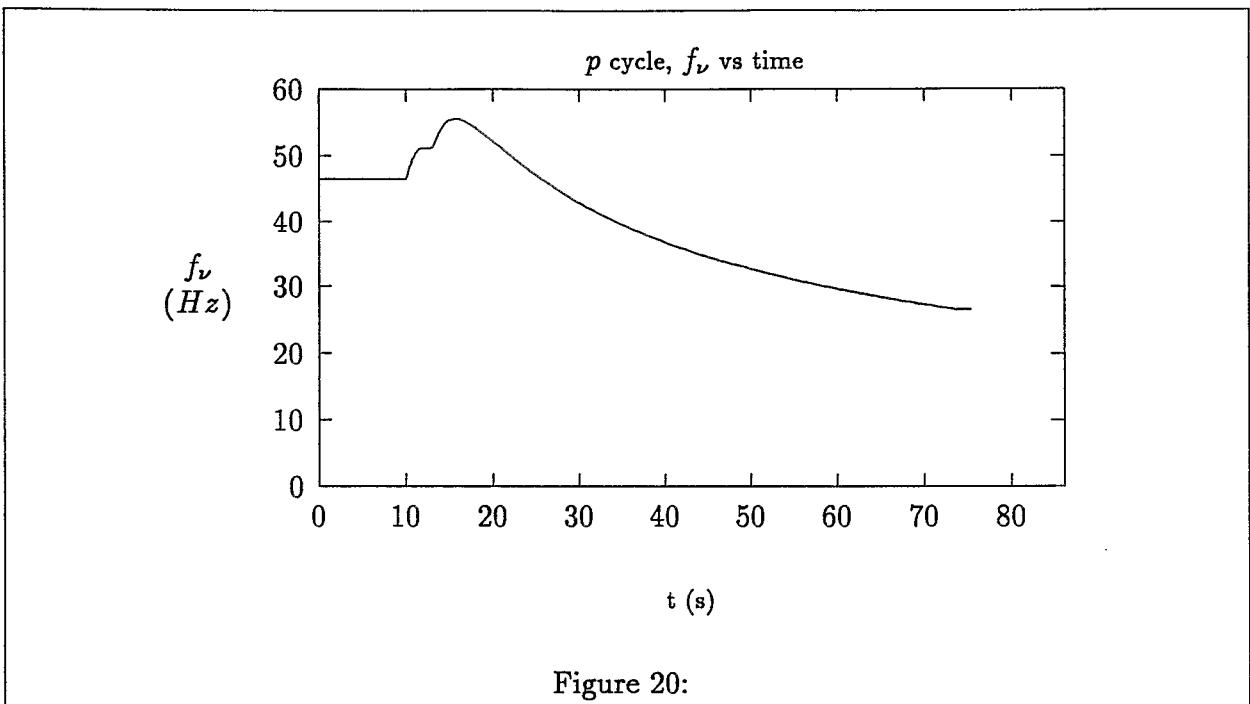


Figure 19:



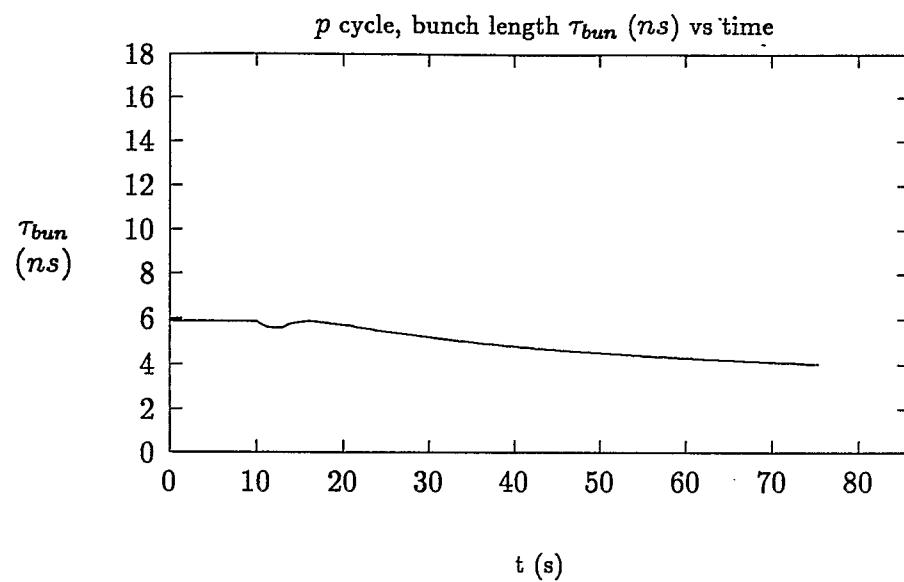


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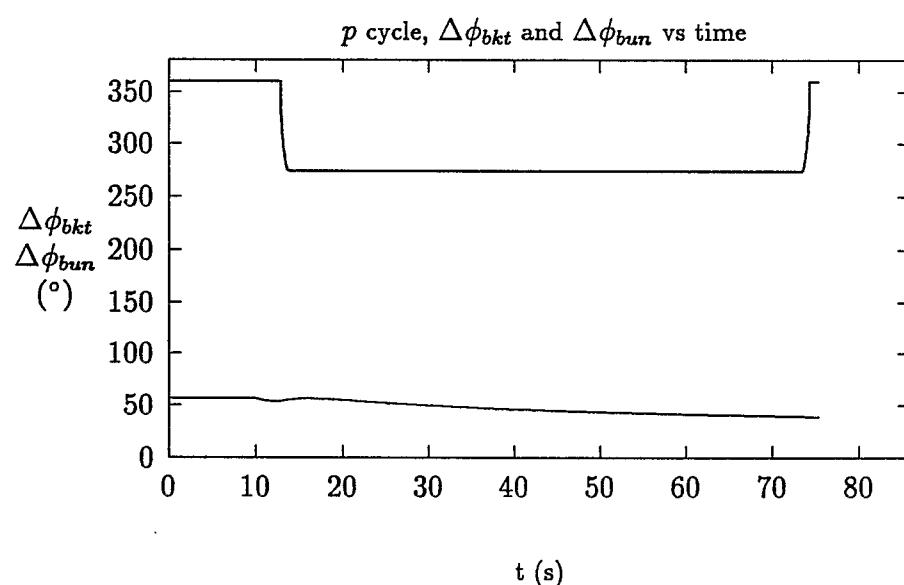


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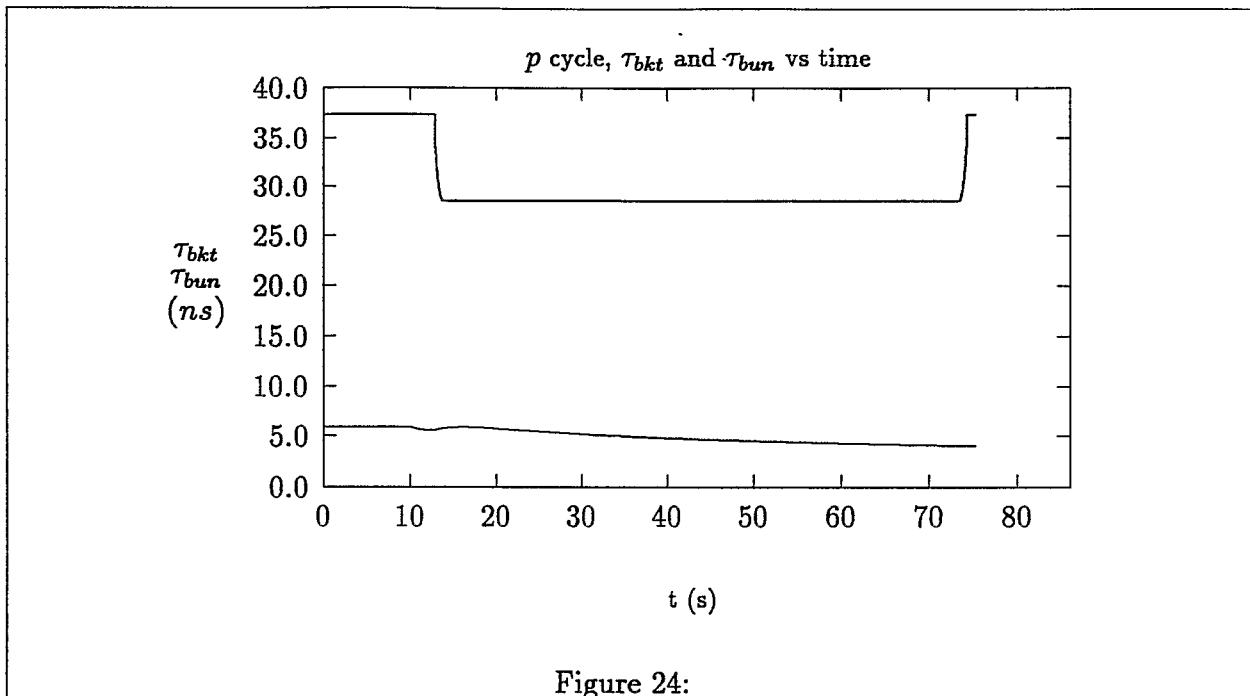


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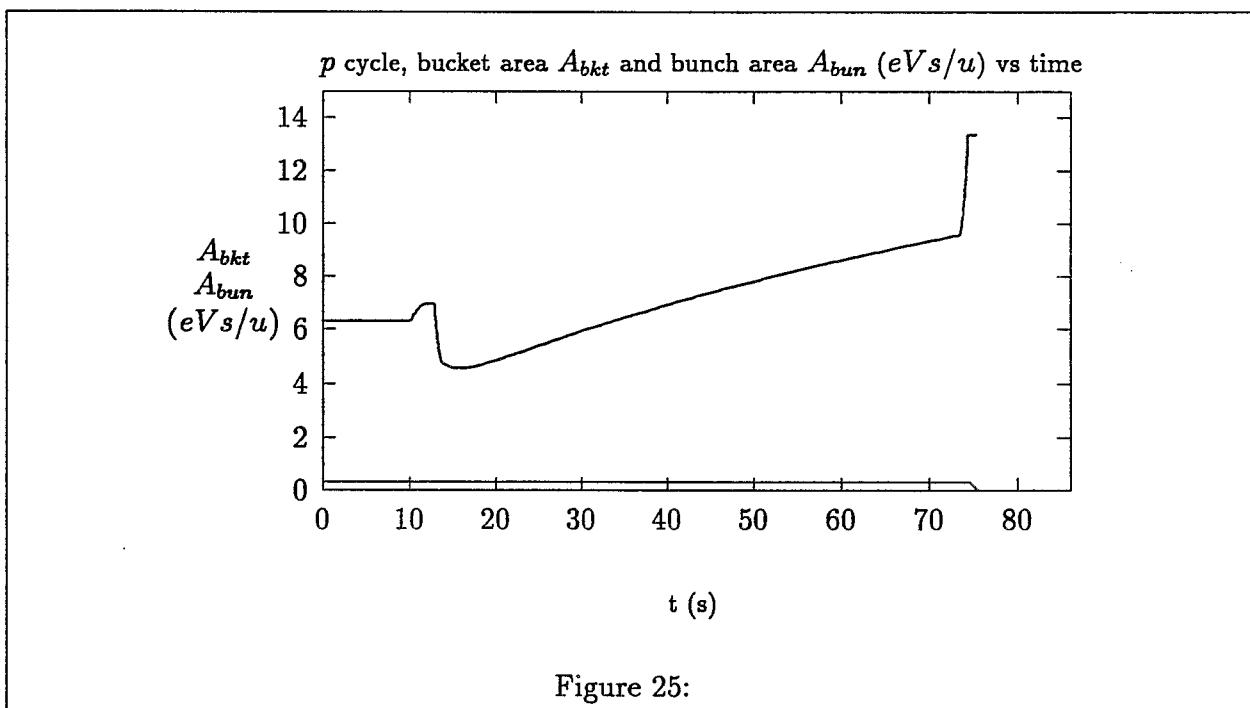


Figure 25: